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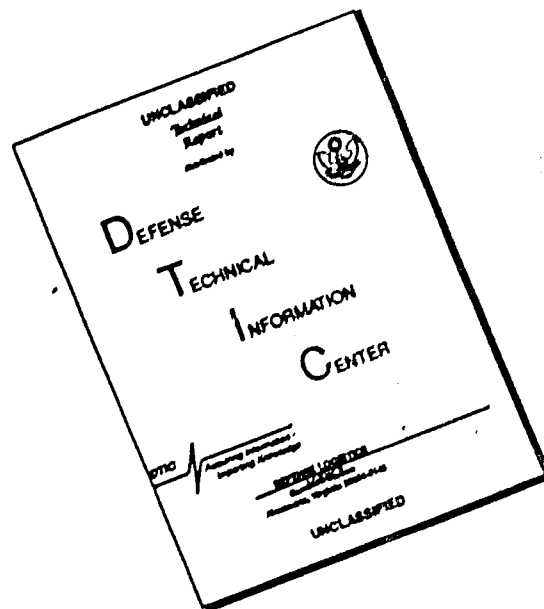
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DEPARTMENT OF THE ARMY
OFFICE OF THE ADJUTANT GENERAL
WASHINGTON, D.C. 20310

(Handwritten initials)

AD 842071

IN REPLY REFER TO

AGAM-P(M)(17 Jul 67)FOR OT

19 July 1967

SUBJECT: Operational Report - Lessons Learned, HQ, 20th Engineer Battalion (Combat)

TO: SEE DISTRIBUTION

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1. Forwarded as inclosure is Operational Report - Lessons Learned, Headquarters, 20th Engineer Battalion (Combat) for quarterly period ending 31 January 1967. Information contained in this report should be reviewed and evaluated by CDC in accordance with paragraph 6f of AR 1-19 and by CONARC in accordance with paragraph 6c and d of AR 1-19. Evaluations and corrective actions should be reported to ACSFOR OT within 90 days of receipt of covering letter.

2. Information contained in this report is provided to the Commandants of the Service Schools to insure appropriate benefits in the future from lessons learned during current operations, and may be adapted for use in developing training material.

BY ORDER OF THE SECRETARY OF THE ARMY:

Kenneth G. Wickham

KENNETH G. WICKHAM
Major General, USA
The Adjutant General

1 Incl
as

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(Continued on page 2)

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HEADQUARTERS
20TH ENGINEER BATTALION (COMBAT)
APO San Francisco 96318

EGC-20E-3

12 February 1967

SUBJECT: Operational Report-Lessons Learned (RCS CSFOR-65),
for Quarterly Period Ending 31 January 1967

THRU: Commanding Officer
937th Engineer Group (Cbt)
APO 96318

Commanding General
18th Engineer Brigade
APO 96307

Commanding General
United States Army Engineer Command (Prov)
ATTN: AVCC-BC
APO 96491

Commanding General
United States Army, Vietnam
ATTN: AVC-DH
APO 96307

Commander in Chief
United States Army, Pacific
ATTN: GPOP-MH
APO 96558

TO: Assistant Chief of Staff for Force Development
Department of the Army (ACSFOR DA),
Washington, D. C. 20310

Section 1. Significant Organization or Unit Activities.

a. General:

At the beginning of the report period the Battalion Headquarters, Headquarters Company, Company A, Company C, and the 584th Engineer Company (IE) were located in the 4th Division's Dragon Mountain Base Camp at Pleiku, Republic of

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Vietnam. Company A was engaged in the construction of an interim Water Supply System in the Dragon Mountain Base Camp. Company C was constructing a "Chinaman" loading ramp and a crusher headwall for the operations of the 584th Engineer Company (LE) which had the mission of constructing the 4th Infantry Division Forward Liaison Airfield, up grading of QL-19W to a class 35, two way, class 50 one way bridges, all weather road, and the development and operation of a rock quarry on QL-19W. Company B (-) was located at Phu Tuc and was continuing construction of a C-130 airfield and FASH (forward assault heliport) area. The third platoon of Company B was located at Nhon Co with the mission of rehabilitating a C-130 airfield and clearing areas for two airmobile companies and two Infantry Battalions.

On 3 November 1966, Company C assumed the responsibility for upgrading Rte QL-19W and work was immediately begun on making emergency repairs on a ten mile section of road directly east of Duc Co vicinity YA839249. Concurrently, haul operations were begun to place decomposed granite fill on QL-19W and to repair a re-inforced concrete bridge near the quarry.

On 9 November 1966, the 584th Engineer Company (LE) completed work on the 4th Division Forward Liaison Airfield.

On 11 November 1966, one platoon of Company A began constructing a timber bridge on QL-19W vicinity YA975291. The project consisted of installing a by-pass around a existing MATC tactical bridge, removing the MATC bridge, clearing the gap of timber and concrete and then erecting a three span timber trestle bridge. It was later decided to drop the concrete slab of the old bridge and place the bridge footers directly on this slab. Soil samples of the river bottom, however, indicated that this plan was not feasible and as a result a pile bent bridge was begun and the project was completed on 3 December 1966.

On 10 November 1966, the 20th Engineer Battalion was attached to 937th Engineer Group (Cbt).

On 13 November 1966, Company A (-), with one platoon of the 4th Engineer Battalion attached, was airlifted to an LZ vicinity YA6055. Immediately, clearing of the LZ was initiated and by 1800 hrs a landing zone large enough to accomodate a battalion was completed. Clearing and

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Improvement of the landing zone continued until Company A was extracted on 15 November 1966.

On 18 November 1966, Company C (-) was relieved from its mission on QL-19 and moved to the vicinity of YA7450 on the SE SAN River. Company C (-) was given the mission of constructing a pioneer road (designated Route 509B) from the SE SAN River to a forward area near the Cambodian border. Two Rome Plows (K G Clearing Blade) were attached to Company C for this operation. Almost immediately the scope of the project changed and 509B was to become a well shaped, adequately drained, correctly orientated, one way road. 5,500 meters of road and an artillery fire support base 150 x 250 meters had been completed when Company C (-) withdrew on 6 December 1966.

On 24 November 1966, Company A assumed responsibility for construction in the Dragon Mountain Base Camp and for constructing the 4th Division Special Staff area. Work is presently continuing on both of these projects.

On 2 December 1966, Company D, 35th Engineer Battalion was attached to the 20th Engineer Battalion and assigned the mission of re-locating the Polei Djerong Special Forces Camp to vicinity YA875458, constructing an adjacent C-130 Airfield, and constructing an Artillery Battery position to include pads for four (4) 8"/175 mm guns. The project was completed on 30 January 1967, and Company D, 35th Engineer Battalion relocated to Oasis vicinity ZALL28 to renovate the existing runway at the location to C-130 criteria, providing parking facilities for 5 C-130 aircraft and constructing a FAS.I area for 40 helicopters.

On 10 December 1966, 3/B/20 completed its mission at Nhon Co and returned to the Dragon Mountain Base Camp.

On 11 December 1966, work was initiated on clearing two (2) 20' x 100' and one 15' x 50' pads on Dragon Mountain for a troposcatter site. This work was supervised by 3/B/20 and was completed on 15 December 1966.

On 15 December 1966, 3/B/20 began laying a 300' test strip of MX-19, a new type aluminum airfield matting, and on 6 January 1967, the platoon began placing this matting on the new Polei Djerong Airfield. The runway and selected associated facilities at this airfield were completely covered with the MX-19 by 17 January 1967.

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On 24 December 1966, Company C (-) departed Dragon Mountain Base Camp for Ban Hloah with the mission of rehabilitating the existing airstrip which had failed. Rain hampered progress on the runway for 10-12 days and the project was completed on 30 January 1967. Immediately, Company C (-) moved to Duc Lap vicinity YU913752 to initiate the construction of a C-130 airfield, and associated facilities.

On 2 January 1967, 3/C/20 resumed construction of Rte 509B extending the road further to the northwest, constructing one fire support base, and beginning work on a second. At the end of the report period, 3/C/20 was still working on the road which had been extended 7,000 meters.

On 6 January 1967, work began on rehabilitating the Flei Ma CV-2 strip and paving an adjacent helicopter landing area. This project was completed on 13 January 1967 by the 58th Engineer Company (VE).

On 28 January 1967, 3/B/20 assumed responsibility for bridge construction on Rte 509.

At the close of the report period, the battalion was actively engaged in the following missions:

1. Rock crusher and quarry operations.
2. 11,492 man cantonment area at the 4th Division Base Camp.
3. 4th Division Special Staff area.
4. Construction of Rte 509B with its associated fire support bases and airfield.
5. Construction of C-130 airfields with associated facilities at Phu Tuc and Oasis.
6. Bridge construction and emergency repairs on Rte 509.
7. Upgrading Rte QL-19N.
8. Final stages of planning and preparation for a move to Duc Lap for construction of a C-130 airfield and associated facilities.

b. Personnel:

The assigned strength of the 20th Engineer Battalion and the attached 58th Engineer Company (LE) on 1 November 1966 was 890 officers and enlisted men representing an overstrength of 85 personnel. This overstrength was deliberately

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planned in order to help eliminate the potential problem that the unit would face on 8 December 1966. This date represented the completion of the Battalion's first year in Vietnam and would see the loss of 14 officers and 270 enlisted personnel through normal rotation. In a further effort to reduce this rotation problem, 3 officers and 62 enlisted men were interchanged with the 14th Engineer Battalion during the first two weeks of November. In addition, 1 officer and 32 enlisted men were curtailed and returned to CONUS during November. As a result of these actions, 9 officers and 161 enlisted personnel rotated from the Battalion during the first week in December.

Replacements for personnel were adequate with the exception of 5 officers, 1 warrant officer (MOS76A10), 12 squad leaders (MOS12B40), 4 supply sergeants (MOS76K40), 1 mess sergeant (MOS94B40), and 1 personnel sergeant (MOS7140). The squad leader shortages were alleviated by re-assigning 12 excess squad leaders from other battalions within the 937th Engineer Group to the Battalion. The remaining positions are still vacant. In addition the Battalion Executive Officer was re-assigned on 21 January 1967 and has not been replaced.

On 2 December 1966, Company D, 35th Engineer Battalion was attached to the 20th Engineer Battalion and was at full strength.

At the close of the reporting period the Battalion and its attached Companies had an assigned strength of 34 officers, 3 warrant officers, and 922 enlisted personnel representing a shortage of 6 officers, 1 warrant officer, and 33 enlisted personnel.

During the report period the battalion suffered no KIA and 3 MIA's. Personnel of the Battalion received 5 Purple Heart Medals, with one pending approval, and 65 awards for meritorious service or achievement.

At the present time the Battalion is employing 40 civilian carpenters and 20 civilian quarry workers on a permanent hire basis. In addition, an average of 100 AIC daily workers were hired for various projects as general laborers. In all cases these civilian personnel have enabled the Battalion to release engineer soldiers to other more technical tasks.

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The Battalion Chaplain holds three Protestant services on Sundays in the Battalion Area and nearby project sites. In addition a film of a religious nature is shown on Sunday nights to get the men interested in attending chapel. A Catholic service is held every Thursday night and transportation is provided on Sunday to various Catholic services in the Base Camp. The Battalion also holds services as often as possible at outlying projects, transportation permitting.

c. Intelligence and Security

During the report period the battalion continued to maintain contact with all major units in the Pleiku area for up-to-date combat engineer intelligence. An intelligence summary is picked up daily from the 4th Infantry Division. Detachment C-2, 5th Special Forces Group in Pleiku is consulted concerning intelligence in isolated areas of operation. A daily weather forecast is received from the weather detachment, 4th Aviation Battalion located in the Dragon Mountain Base Camp.

In November 1966, the battalion was assigned a sector on the perimeter of the 4th Infantry Division Base Camp. The Battalion's Physical Security Plan dated August 1966, was adjusted to comply with this assignment. All units of the Battalion located in the Base Camp submitted defense plans for their respective areas and these plans were integrated by the Battalion S-2.

d. Operations and Training

(1) Dragon Mountain Base Camp (Bde #66-236DC-937).

On 22 November 1966, the 20th Engineer Battalion assumed responsibility for base development in the Dragon Mountain Base Camp. Only facilities outlined in the 18th Engineer Brigade Project Directive #66-236DC-937 would be constructed by the Battalion. Facilities required but not included in the assigned scope of work, would be requested separately by the 4th Infantry Division from the Battalion and must conform to USARV space criteria.

The procurement, storage and issue of construction materials is the responsibility of the 20th Engineer Battalion and is charged against specific facilities, i.e. troop mess, Co A, 1/22 Inf. etc. The transportation of

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materials from the depot to the 20th Engineer Battalion S-4 yard is the responsibility of the 20th Engineer Battalion, but transportation is augmented on as needed basis by units of the 4th Infantry Division.

It was found that a "Self-Help" program for the construction of troop facilities offered the most efficient utilization of resources available. Thus prefabricated building components are manufactured by Company A making maximum use of Vietnamese laborers. These prefabricated components are issued to various 4th Infantry Division units to erect with technical assistance being provided by Company A.

(2) 4th Infantry Division Special Staff Area.

On 24 November 1966, Company A was given the responsibility for the construction of the Division Special Staff Area. This complex consisted of eleven (11) tropicalized double quonsets and seven (7) 20' x 100' tropical buildings. Three (3) more tropical buildings were to be constructed at a later date. At the close of the reporting period all of the double quonsets and one (1) tropical building were completed. Concrete pads for two additional tropical buildings were poured. Work on this project was stopped and emphasis was shifted to the construction of mess halls in the Division Area.

(3) Dragon Mountain Water Supply System.

This project was initiated by Company A during the last week in October and consisted of constructing a pump station and intake system at Lake Ia Bang vicinity AR822358, a six (6) inch pipeline from the lake to the Base Camp, a 1,000 barrel storage tank and a manifold system.

After surveying the pipeline route the pipe was distributed as required by the pipelaying crews. A suspension bridge with a 300' clear span was constructed over a deep ravine and the pipeline was placed underground inside the base camp.

The project was completed and turned over to the 4th Infantry Division on 7 November three (3) days ahead of schedule.

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(4) Reconnaissance Missions.

During the reporting period the Battalion performed several reconnaissances to gather information for future missions. These included:

a. Reconnaissance and an engineer work estimate of Route 148 from Route 509 vicinity YA902446 to Route QL-19W vicinity YA903270. The engineer work estimate determined the effort necessary to upgrade the road to class 35 two-way, class 50 one-way, all weather standards. This reconnaissance was performed in early November 1966.

b. An Engineer reconnaissance was made of Route 509 in early November 1966 to locate suitable laterite and rock sources for use as surfacing on Route 509.

c. An Engineer work estimate was performed in early November 1966 to determine the amount of Engineer work effort necessary to rehabilitate the existing airfield at Ban Eloch.

d. An Engineer work estimate was performed in early November 1966 to determine the work effort necessary to rehabilitate and up-grade Oasis Airfield to C-130 standards.

e. An Engineer work estimate was made in early November 1966 to determine the work effort necessary to construct a new CIDG Camp and an associated C-130 airfield at new Polei Djoreng. Several associated reconnaissances were made to determine the exact location of four 8"/175 mm artillery pads which were to be built in conjunction with the CIDG Camp.

f. Two reconnaissances were made in the vicinity of Duc Lap CIDG Camp to determine a location for a proposed C-130 airfield, its associated facilities, and an access road between the airfield and Route 14.

(5) Combat Support Missions.

During the report period there was a decrease in the number of combat support missions assigned to the Battalion; however, the level of effort remained the same.

a. On 130800 November 1966, Company A received

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a warning order to be prepared to move to the west near the Cambodian Border to perform a landing zone (LZ) clearing operation. Company A (-), with one platoon of the 4th Engineer Battalion attached, departed Base Camp at 1030 the same day and moved to Camp Holloway. At 1400 hrs Company A was airlifted to Poloi Djerang. At 1430 hrs the Company was airlifted into a small LZ vicinity YA6055 where it immediately began to enlarge the area. By 1800 hrs a LZ large enough to accommodate an infantry battalion was completed. Concurrent with the clearing operation, the 1/12 Infantry Battalion with supporting artillery, moved to the LZ. Clearing, enlarging, and improving the defensive positions in the area continued throughout the next day, 14 November 1966. Extraction of Company A (-) was accomplished the morning of 15 November 1966.

b. On 18 November 1966, Company C (-) moved to the SE SAN River vicinity YA7450 to continue a pioneer road (designated 509B) previously initiated by the 4th Engineer Battalion. The Battalion's responsibility for the road began on the north shore of the SE SAN River.

Almost immediately the scope of work changed from the construction of a pioneer road to the construction of a well shaped, adequately drained, and correctly oriented one way road. Two Rome Plows (with K G clearing blade) were attached to Company C. The Rome Plow was assigned to expedite cutting of a 30' wide path through dense jungle.

When enemy contact began to drop off in this area, the work on Route 509B was discontinued on 6 December 1966 after 5,500 meters of roadway and one fire support base were constructed.

c. On 2 January 1967, 3/C/20 moved back across the SE SAN River to resume construction of Route 509B. Two Rome Plows, in addition to two bulldozers, were attached to the platoon. Work continued on building the road to the northwest and constructing fire support bases so the artillery could move to forward positions. By the end of the report period an additional 7,000 meters of road and one fire support base had been completed, and work had started on clearing a second fire support base.

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(6) Other Combat Support Missions.

In addition to the above-mentioned combat support missions which were in direct support of current combat operations, the Battalion was actively engaged in several missions designed to prepare areas for future operations. Specifically, these missions were:

a. Company B (-) continued to construct the Phu Tuc Airfield complex. This included a C-130 runway with a 150' x 750' parking apron, a FASH area. By the end of the reporting period the parking apron had been completed, and C-123 aircraft were able to land. The FASH area was approximately 90% complete, all T-17 membrane necessary to cover the runway and parking apron was on hand, and the estimated completion date of the project is 1 March 1967.

b. 3/2/20 continued to work on repairing the existing airfield at Nhon Co. A second treatment of KC-2 was applied and fines were placed on the runway. The runway was then rolled with a towed, smooth wheel, vibratory compactor. Clearing for a Brigade Bivouac area and helicopter parking area was completed and the platoon was extracted on 10 December 1966.

c. On 24 December 1966, Company C (-) moved to Ban Bloch to rehabilitate the existing airfield which had fallen into serious disrepair. The western 1,000' of the runway was badly rutted, the fill under the T-17 membrane was extremely saturated, and the drainage of the area was found to be inadequate. After removing all of the T-17 membrane, the runway and parking apron were scarified. Both the runway and parking apron were allowed to dry, were re-filled and recompact, and the centerline was raised one foot and capped with a 7" layer of decomposed rock. The runway was again graded and compacted and the membrane was repaired and replaced.

Rain during early January hampered operations and slowed progress. On 23 January 1967 a C-123 landing was made and the runway crown was considered to be excessive. As a result, the membrane was removed and the runway reshaped and then covered again with the membrane. The project was completed on 30 January 1967 and Company C prepared to move to Duc Lap CIDG Camp on 1 February 1967.

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d. On 3 December 1966, Company D, 35th Engineer Battalion moved to vicinity YA8646 to construct the new Polei Djereng CIDG Camp and C-130 airfield. In addition to the CIDG Camp, four (4) 8 1/2 x 175 mm gun pads with associated ammunition & personnel bunkers were to be constructed. Effect on the CIDG Camp consisted of clearing and leveling specified areas, replacing the outer defensive wire and building a bypass road around the camp.

Work on the artillery position was more extensive. Four (4) gun pads 36" in diameter with their associated ammunition and personnel bunkers were constructed. In addition, a latrine, shower, mess hall, FLC, garbage rack, wash stand, and maintenance slab were constructed and slots for future construction were dozed.

The C-130 airfield was constructed in accordance with MACV TB-415-2-1. The runway was initially an earth strip capped with a 6' layer of laterite. 3/3/20 then covered the runway with MX-19 aluminum mat, the first use of the MX-19 matting in Vietnam. No accessory kits were available, and the expedient anchorage system as found in the Kaiser Aluminum Company's preliminary manual was installed. On 24 January 1967, a C-130 standardization flight was made and the runway was found to be in excellent condition. A detailed after-action report on the use of MX-19 was submitted upon the completion of the project.

(7) Lines of Communication.

During the reporting period work continued on upgrading LOC's in the Battalion area of responsibility. Emphasis was placed on the following roads:

- a. CL-19. The 50th Engineer Company (L) continued responsibility for upgrading of CL-19. 1/A/20 began work on a class 55, one-way, pile bent bridge, vicinity YA976291 on 11 November 1966 and completed the bridge on 3 December 1966. 2/C/20 completed repair of a concrete slab bridge vicinity ZA077310. Several holes had been blown in the slab but the supports were not damaged. It was repaired by exposing all re-inforcing rods in the damaged areas, cutting the rods leaving 3" studs, welding new re-inforcing bars between studs, and then placing new concrete in the holes. Curbing was also placed on the bridge and repairs were completed on 30 December 1966.

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Approximately 21 kilometers of sub-base were constructed and work continues on improving and emplacing drainage structures. The construction plan is to first bring the road to fair weather standards and then gradually up grade it to an all weather capability. In conjunction with the rehabilitation of the road a quarry site has been developed in the vicinity of ZA072311 to provide rock for a wearing surface for the road and concrete aggregate for the Dragon Mountain Base Camp construction.

b. Route 509. Main work effort was concentrated on keeping this road continuously open to traffic, as it remains the primary LOC for the 4th Infantry Division. Emergency repairs have been made on an as needed basis to repair damaged culverts and bridge approaches. Work was initiated on the construction of two timber bridges vicinity YA882458 and YA872455, with the former being completed as this quarter closed.

(8) Training.

Since a large percentage of replacements continued to arrive with non-engineer MOS's the OJT program continued to receive considerable command emphasis.

The training program has been directed toward the accomplishment of assigned and potential missions. To better delineate the requirements for this type of training, a new Battalion training regulation was published during the report period.

e. Logistics:

(1) Labor.

As stated previously, the Battalion utilizes indigenous Aid-in-Kind (AIK) personnel for much of the construction work in the 4th Infantry Division's Dragon Mountain Base Camp. For simple, unskilled labor, Montagnard personnel have been utilized with satisfactory results. The Battalion's barber and tailor shop are staffed by indigenous personnel and AIK personnel are also utilized to perform various semi-skilled tasks in motor pools.

(2) Maintenance.

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Maintenance and repair parts support for the battalion remained a critical problem throughout the reporting period. Items such as starters, generators and fuel filters for 5 ton dump trucks are extremely difficult to obtain through normal supply channels. Since 16 November 1966, five (5) Red Ball requisitions for starters have been submitted, but none have been received.

Due to the large area of operations assigned the Battalion, major repairs on equipment are very difficult to accomplish. DS maintenance will send contact teams into remote areas when repair parts are on hand. Transportation for these teams, their equipment and repair parts is somewhat difficult to arrange.

(3) Supply.

During the reporting period 4,000 tons of all classes of supply were transported by organizational transportation. The following quantities of major Class IV materials were placed on requisition in support of construction projects:

Cement	64,823 bags
Lumber	1,841,320 BF
SSP	1,384 bundles
Nails	64,100 lbs
Penoprimo	11,275 drums
Culvert	5,886 linear foot
Quonsets	26 EA
Sandbags	1,235,000 EA

A heavy increase in the amount of bridging timbers requisitioned and stocked was necessitated by several missions to construct timber trestle bridges as replacements for tactical bridging.

Due to the location of Companies B and C of this Battalion, it has been necessary to resupply them by aircraft. A supply rear detachment was established at Cam Rahn Bay to provide resupply to Company B at Phu Tuc. Cam Rahn Bay was chosen as a base for support due to its extensive logistical facilities and the availability of CV-2 aircraft for moving supplies. Company C was resupplied from the Battalion base camp utilizing aircraft from the 937th Engineer Group (Cbt), the 4th Division, and additional C-47 aircraft as required.

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The battalion water point teams continued operations in support of units on outlying construction sites. Considerable difficulty has been encountered in the maintenance of the 10KW, Kurtz-Root generator which powers the 1,500 GFH ordlators.

f. Medical:

During the quarter 1,565 out patients and 47 quarters patients were treated in the Battalion aid station and 30 patients were hospitalized. Among these patients there were 3 injuries and no deaths attributed to combat.

The medical section has maintained a suspense file on immunization records to insure adequate and timely immunization of all personnel.

An aggressive anti-malaria program continues to be followed by the Battalion. Both Dapsone (DDS) and Chloroquine-primaquine tablets are included in this program. A very practical solution to insure the daily dosage of Dapsone for each man has been roster distribution at squad and section level. Constant checks are made to insure personnel make use of mosquito nets at night and follow the standard anti-malaria practices.

g. Communications:

It has been found that the FM series radios if maintained properly are much more reliable than the AM radios. The new series FM radios have provided continuous communications up to three times their normal range.

By using various antenna's at different angles the Battalion is able to over-ride interference from other units. On AM, by using a tuned inverted "L" transmitter antenna and a center-fed Hertz Receiver, antenna maximum efficiency and reliability were attained. Interference from other units can be easily over ridden using this antenna combination and reliable AM communications can be maintained 24 hours a day.

By lubricating the servo motors and tuner motor in the AM/GAC-19 the down time on the radio has been reduced 30%. This lubrication is necessary in the Pleiku area because the damp climate caused spindles to corrode.

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Section 2. COMMANDER'S OBSERVATIONS AND RECOMMENDATIONS:

Part I. Observation:

a. Personnel: None

b. Operations:

(1) Item: Bridges:

Discussion: On two occasions this unit has started to erect bridges which were designed on incomplete reconnaissance reports, and the substructure had to be redesigned. Due to the extreme variations of stream bottoms encountered in this region, it is not possible to assume what will be encountered.

Observation: Prior to the design of any bridge, bottom samples and, if possible, auger or drill samples should be obtained from the bridge site.

(2) Item: Aligning Frame:

Discussion: The original design for the pile bent bridge installed by this unit did not provide for an aligning frame. This frame was found to be necessary to properly cut and align the piles so a uniform bearing surface was maintained between all piles and the cap.

Observation: Aligning frames should be included in all pile bent designs.

(3) Item: Bolted Steel Tank Bottom:

Discussion: It was found that the final section of the tank bottom was extremely difficult to install, and that improper orientation of the first piece of bottom caused difficulty in orienting the deck properly.

Observation: The following points in bottom erection should be followed.

- a. The initial section should be so oriented that the angle iron which supports the ladder and the seam of the first two sections form a straight line.

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- b. All bolts should be only hand tightened until the final section is in place.

(4) Item: 6" Outlet on 1,000 Barrel Tank

Discussion: It was found that the radius of curvature on a 1,000 barrel tank is too great to attach a 6" flange outlet by cutting the proper size hole, and bolt fittings.

Observation: 6" openings on 1,000 barrel tanks must be welded.

(5) Item: Pipeline

Discussion: During the construction of the pipeline it was found that various tools and equipment needed for pipeline work were not included in the normal combat Engineer Battalion. Some were made, but others could not be duplicated.

Observation: A set of tools common to a pipeline platoon should be issued to a combat platoon or company when a pipeline mission is assigned.

(6) Item: Flotation System and Intake Screen on a Pipeline

Discussion: During the design and construction of the pipeline system it was discovered that the intake of the pipeline could not be more than 36" below the level of the centrifugal pump. Secondly, the lake was very shallow and filled with much under-water foliage and debris.

Observation: A pipeline flotation system was designed and constructed from 55 gallon drums and steel pickets. The drums provided the flotation and the pickets cradled the pipe so that it extended 360 feet out into the water where a deeper and relatively debris free area was located. In order to prevent the entry of foreign material into the system a 2 x 2 x 2 foot intake screen constructed of screen wire and pickets was welded to the pipe.

(7) Item: Chain Saws

Discussion: During landing zone clearing operations the deadline ratio of chain saws was found to be extremely high. The cause was traced to the very hard wood in

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the area, i.e. Teak and Mahogany.

Observation: To insure a reliable chain saw capability in similar combat operations, it is recommended that a chain saw blade be designed for use on hard wood trees. ✓

(8) Item: Soft spots on Runway

Discussion: Numerous soft spots were encountered during construction of the Phu Tuc runway and normally were of two types:

- a. Very Organic.
- b. Silty Sand with a high moisture content.

Both of these types of soft spots would be a hazard, as they become spongy very quickly with continuous air traffic. Excavation showed that a hard clayey material was trapping ground water beneath the surface.

Observation: At first these areas were completely excavated. Many were 20' wide 120' long and 8'-10' deep. Large quantities of material were required to refill these holes. This worked well but was time consuming and required a large engineer effort. In areas which were silty sand, at the first sign of a spongy effect, engineer construction vehicles were kept off this spot. These areas were carefully excavated to a depth of 3' to 4' and then rocks placed in the bottom 2'. Fill was then placed and compacted and the results were satisfactory. With further experimentation it was observed that upon the first indication of a spongy spot if all traffic remained away from the questionable area, a shallow excavation of only 3' to 4' was necessary. The first two feet of this was filled with a loose uncompacted decomposed granite and then the final two feet were filled and compacted. This method has been used on four soft spots and has yielded excellent results.

(9) Item: Teaming of Rome Flows and bulldozers for road clearing operations.

Discussion: Initially on the 509B project two Rome Flows and one bulldozer were used to clear a path for a roadway through a dense jungle. The Rome Flows made the initial cut and the dozer would follow up doing rough road construction. The Rome Flows work very fast and very efficiently and soon leave the dozer far behind.

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Observation: The ideal combination was determined to be two bulldozers for every Rome Flow.

(10) Item: Orientation of Roads in Dense Jungle

Discussion: It was found that the proper orientation of a road in dense jungle is extremely important and equally difficult. If the road is being built for immediate use it is necessary to avoid as much time consuming culvert work as possible. To this end the road must be oriented primarily on ridge lines avoiding all low ground and depressions.

Observation: A foot reconnaissance party should be kept well out in front of the initial item of equipment. This party should determine the best route to follow and mark it for the equipment. Also, frequent air reconnaissance is required to help avoid possible trouble spots.

(11) Item: Demolitions versus the Rome Flow

Discussion: Many demolitions were transported to the 509B project to fell trees that were thought to be too big for the Rome Flow. Experience soon indicated that the Rome Flow could easily fell any size tree encountered much faster than the time required for demolition work.

Observation: Demolitions normally will not be required for clearing operations utilizing a Rome Flow.

(12) Item: Overestimation of work required on saturated airfields.

Discussion: Upon arriving at the Dan Elch Airfield it was assumed that because the surface was extremely spongy the red clay material under the membrane was saturated to a depth of 3' or 4'. After investigation it was found that, in reality, a maximum of four inches of material was saturated and below this depth material was usable.

Observation: After membrane removal, sample borings should be made on the runway to determine the depth of saturation to eliminate unnecessary removal of usable material.

(13) Item: Decomposed Granite for Roads.

Discussion: Decomposed granite can be used successfully as a base course for roads. Decomposed granite

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compacts easily but it is not suitable for a surface course since it powders under traffic as it dries out.

Observation: When using decomposed granite in road construction, it should have a surface course applied as soon as possible to preclude powdering and early failure.

(14) Item: Damaged MX-19 panels

Discussion: The preliminary manual on MX-19 states that a 10% wastage factor should be expected when using this mat. This was found to be excessively high and a 1% wastage factor is more realistic. Punctured panels can be used in the anchorage system and panels with damaged connectors can generally be repaired with a cold or wood chisel.

Observation: Through careful repair and judicious use of damaged MX-19 panels the wastage factor can be held to a minimum.

(15) Item: Condensation under MX 19

Discussion: When removing the MX 19 mat from the new Polei Djereng parking apron considerable condensation was discovered on the underside of the mat. The exact cause of the condensation is unknown but it is believed that when the MX 19 is placed over an uneven surface the mat traps cool air at night which condenses during the warmer days.

Observation: Care should be taken to insure that the sub-grade is well graded and free of voids.

(16) Item: Anchorage of MX-19 Airfield Matting

Discussion: Upon completion of a 3,500 foot airfield covering of MX-19 it was observed that the last panels emplaced did not form a straight line. Variations were as much as 6" and this discrepancy would have made the emplacement of the anchorage system very difficult.

Observation: A road grader was used to align these end panels. Care was taken to see that only small movements were made each time the grader pushed against the panels. The results were very satisfactory resulting in an alignment variation of less than 1" with no damage to the MX-19 panels.

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SUBJECT: Operational Report-Lessons Learned (RCS CSFOR-65),
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(c) Maintenance:

(1) Item: Direct Support Maintenance.

2, Discussion: Direct support maintenance facilities are inadequate for the density of equipment they are required to support. A high dead line rate results and equipment requiring maintenance at this level is slow to be repaired.

Observation: Direct support maintenance facilities should be increased rapidly as the equipment density in an area increases.

(2) Item: D7E Dozers.

Discussion: D7E dozers were received in December 1966 as part of the Army Standardization Program. They were shipped with an overpack of repair parts, however the repair parts supplied are insufficient for sustained operation. The support maintenance facility also has not received repair parts to support this new equipment.

Observation: New models of equipment should be shipped with a more complete proscribed load of repair parts and support maintenance facilities should also be supplied with necessary repair parts at the same time the equipment is shipped to the unit for use.

(3) Item: Failure of D7E grills to protect radiator.

Discussion: The grill of the D7E dozer is made of a very brittle metal. When this material is struck by a rock or other debris it has been breaking and allowing the radiator to be damaged. An equipment improvement recommendation on this deficiency was submitted on 15 January 1967.

Observation: A grill of PSP has been fabricated to cover the front of the dozer and protect the radiator.

Part II, Recommendations: NONE

1 Incl
1. Organizational
Structure,
20th Engineer Battalion

ROBERT L. GILMORE
ITC, CE
Commanding

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EGC-CO (12 Feb 67)

1st Ind

SUBJECT: Operational Report on Lessons Learned for Period 1 November 1966
to 31 January 1967 (PCS CSFOR-65)

DEPARTMENT OF THE ARMY, HEADQUARTERS, 937TH ENGINEER GROUP (COMBAT), APO
96318, 21 February 1967

TO: Commanding General, 18th Engineer Brigade, ATTN: AVFC-C, APO 96377

1. The subject report, submitted by the 20th Engineer Battalion (Combat), has been reviewed and is considered a well compiled report of organizational activities.

2. The following comments are added:

a. Reference Section 2, Part I, Item: (5). The 20th Engineer Battalion (Combat) was augmented with two experienced pipeline personnel, a grooving and beveling machine, and a pipeline tool set from the 697th Engineer Company (Pipeline). No additional items were requested by the 20th Engineer Battalion (Combat).

b. Reference Section 2, Part I, Item: (7). This headquarters agrees with recommendation that a chain saw blade should be designed for use on hard wood trees. The 8th Engineer Battalion, 1st Cavalry Division (ABN), has performed an extensive study on this subject and has formally made a number of recommendations to this effect with which I concur.

c. Reference Section 2, Part I, Item: (15). I consider it unlikely that condensation under MX-19 matting is caused in the way described in the report, but that it is more likely to be the result from the cooling at night of warm, moist air entrapped during the day. Temperature values are being recorded at the airfield to determine temperature differentials and data obtained is expected to make possible a more comprehensive study of this problem.

d. Reference Item: c.(1), Page 20. A number of actions have been instituted in an attempt to correct the inadequacies in direct support maintenance in the Pleiku area. Discussions between myself and the responsible maintenance unit commanders have obtained positive results. As additional demand data is established, and ASL's are filled, I am confident that back-up maintenance support will show further marked improvements.

E. P. Braucher

E. P. BRAUCHER
Colonel, CE
Commanding

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AVBC-C (12 Feb 67) 2nd Ind Cpt Mills/cky/DBT-163
SUBJECT: Operational Report Lessons Learned for the Quarterly Period
Ending 31 January 1967 (RCS CSFOR-65)

Headquarters, 18th Engineer Brigade, APO US Forces 96377 8 Apr 67

TO: Commanding General, US ARMY Engineer Command, Vitenam, (Prov) APO
US Forces 96471 ATTN: AVCC-BC

1. This Headquarters has reviewed the Operational Report - Lessons Learned of the 20th Engineer Battalion (Combat) for the period ending 31 January 1967 and considers it an excellent narrative of unit activities and accomplishments.

2. Concur with the observations of the submitting commander, as indorsed by the Group Commander, with the following comment:

Section 2, Part I, para b (5) - Pipelines - pipeline construction tools may be constructed as temporary loan items per paragraph 20e, AR 310-34, for a period up to 180 days, to assist in completion of specialized projects.

HAROLD H. ST CLAIR
Colonel, CE
Acting Commander

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AVCC-MHD (12 Feb 67) 3d Ind MAJ Fowler/wgk/BH 478
SUBJECT: Operational Report-Lessons Learned (RCS CSFOR-65) for Quarterly
Period Ending 31 January 1967


HEADQUARTERS, UNITED STATES ARMY ENGINEER COMMAND
VIETNAM (PROV), APO 96491 25 APR 1967

TO: Commanding General, United States Army, Vietnam, ATTN: AVHGC-DH,
APO 96307

1. The subject report, submitted by the 20th Engineer Battalion (Cbt),
has been reviewed by this headquarters and is considered adequate.

2. The recommendations and comments submitted by the indorsing and
submitting commanders have been reviewed and this headquarters concurs with
the report as indorsed. With respect to hardwood chain saws, ENSURE action
has been requested of, and initiated by USARV to obtain these items.

FOR THE COMMANDER:


RICHARD J. DUCOTE
Colonel, CE
Chief of Staff

USARV, ATTN: AVHGC-DH

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AVHGC-DST (12 Feb 67)

4th Ind

SUBJECT: Operational Report-Lessons Learned for the Period Ending
31 January 1967 (RCS CSFOR-65) (U)

HEADQUARTERS, UNITED STATES ARMY VIETNAM, APO San Francisco 96307 15 MAY 1967

TO: Commander in Chief, United States Army, Pacific, ATTN: GPOF-OT
APO 96558

1. This headquarters has reviewed the Operational Report-Lessons Learned for the period ending 31 January 1967 from Headquarters, 20th Engineer Battalion as indorsed.

2. Pertinent comments follow:

a. Reference 1st paragraph, page 13; paragraph 2c(1), page 20; and paragraph 2d, 1st Indorsement, concerning direct support maintenance and repair parts support: As indicated in 1st Indorsement, maintenance support has shown marked improvement. It is expected that recent deployments of maintenance units will result in further improvement. The Red Ball Express control office will query the unit directly, and if the required repair parts have not been received and are still required, action will be taken by 1st Logistical Command to place them on Red Ball Express requisition again. Several other actions are underway to improve normal supply channel response to repair parts requirements. These include Project Counter, continued increase in the capability of the 14th Inventory Control Center, and improved management of the Qui Nhon depot and Fleiku Sub-area Command.

b. Reference paragraph 2b(7), pages 16 and 17; paragraph 2b, 1st Indorsement; and paragraph 2, 3d Indorsement, concerning the requirement for heavy duty chain saws: An urgent evaluation requirement for 252 eighteen-inch and 114 thirty-inch heavy duty, carbide, rope start, self-oiling, chain power saws was established under ENSURE procedures on 11 April 1967.

c. Reference paragraph 2c(2), page 20, concerning repair parts for D7E dozers: Some repair parts to support the D7E dozers were lost

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AVHGC-DST (12 Feb 67)

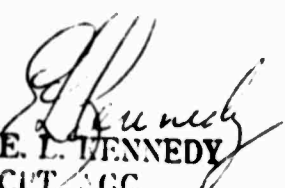
4th Ind

SUBJECT: Operational Report-Lessons Learned for the Period Ending
31 January 1967 (RCS CSFOR-65) (U)

through enemy action, creating a temporary shortage. This headquarters will take follow-up action to determine the current status of dozer parts and coordinate with the 1st Logistical Command to satisfy parts requirements.

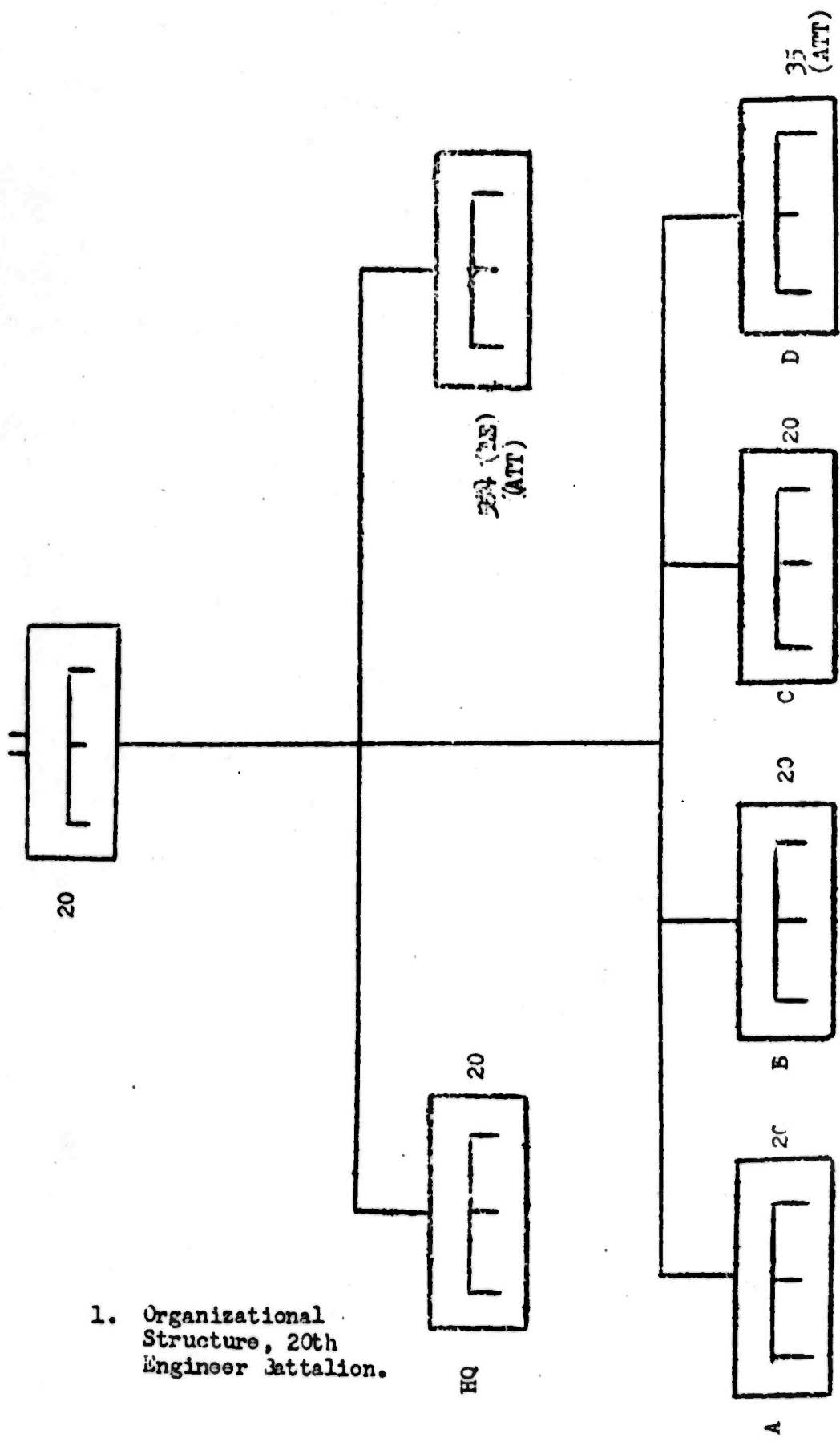
FOR THE COMMANDER:

1 Incl
nc


E. L. KENNEDY
CPT, AGC
Asst Adjutant General

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1. Organizational Structure, 20th Engineer Battalion.

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